CLAIMS

What is Claimed is:

1. A method for applying a coating to an item, the coating consisting in major part of a combination of zinc and chromium, characterized by exposing the item to an aqueous solution comprising effective amounts of hydroxyl ions (OH^-), Zn-containing ions, and Cr-containing ions and of rubidium ions (Rb^+) in major part valence balancing the OH^-.

2. The method of claim 1 wherein:
the amount of Rb^+ is in excess of combined amounts of Na^+ and K^+ in the solution; and
the Cr-containing ions are present in major part as Cr(VI) ions.

3. The method of claim 1 wherein:
the amount of Rb is in excess of combined amounts of other alkali metals in the solution.

4. The method of claim 1 wherein the solution has a pH of at most 13.0.

5. The method of claim 4 wherein the solution has a pH of between 11.0 and 13.0.

6. A method for coating an item characterized by:
exposing the item to an aqueous solution comprising effective amounts of:
hydroxyl ions (OH^-);
one or more ions of alkali metals, alkaline earth metals, or a combination thereof other than Na, to in major part valence balance the OH^-;
Zn-containing ions; and
Cr-containing ions; and
applying a current to the through the item effective to plate exposed portions of the item with a coating consisting in major part of a combination of Zn and Cr codeposited with a flake-like morphology.

7. A coated item manufactured by the method of claim 1.

8. A method for treating a metallic surface comprising:

exposing the surface to an aqueous solution comprising effective amounts of Rb^+, hydroxyl ions (OH^-), Zn-containing ions and Cr-containing ions;

running a current through the surface so as to plate the surface with a coating consisting in major part of a combination of zinc and chromium.

9. The method of claim 8 wherein:

a step of providing the solution comprises introducing the Rb^+ in the solution as RbOH;

the amount of Rb^+ is in excess of combined amounts of Na^+ and K^+ in the solution; and

the Cr in the Cr^--containing ions is present in major part as Cr(VI) ions.

10. An aqueous electroplating solution for the codeposition of zinc and chromium comprising effective amounts of:

hydroxyl ions (OH^-);

one or more ions of alkali metals, alkaline earth metals, or a combination thereof other than Na and K, to in major part valence balance the OH^-;

Zn-containing ions; and

Cr-containing ions.

11. The solution of claim 10 consisting essentially of a solution of:

5-1300 g/l RbOH;

0.1-125 g/l ZnO; and

0.1-50 g/l $Na_2Cr_2O_7 \cdot 2H_2O$.

12. The solution of claim 11 further comprising an amount of ammonium hexafluorosilicate effective to stabilize the solution so as to substantially prevent zinc hydroxide precipitation over a period of at least 3 days.